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E. R. Dodds

A CASE OF PUERPERAL FEVER DUE TO
MIXED INFECTION BY DIPHTHERIA BACILLI AND
STREPTOCOCCI, AND ITS TREATMENT BY THE
SPECIFIC ANTITOXIC AND ANTIMICROBIC SERUMS.

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C O N T E N T S.

I.

- History of
- a. The mother's case
 - b. The Cat's "
 - c. The Baby's "
 - d. The Attendant's "

II.

A Review of the Case as regards

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- (1) Special predisposition .
- (2) Predisposition by Fatigue and Loss of Blood common to all lying in women.
- (3) Influence of Sewer Gas in lowering the Vitality
- (4) Unskilled antiseptic douching.

B. SOURCE AND NATURE OF THE INFECTION WITH A CLASSIFICATION OF THE SYMPTOMS ACCORDING TO THE CAUSAL ORGANISM.

Bacteriological Examination.

III.

AN ESTIMATION OF THE VALUE OF THE THERAPEUTIC MEASURES WITH SPECIAL ATTENTION TO THE RESULTS PRODUCED BY THE SERA.

- (a) General antipyretics.
- (b) Special antipyretic .(Quinine)
- (c) Antiseptics
- (d) Anti-streptococcic Serum.
- (e) Diptheritic Antitoxic Serum.

IV.

Lessons I have learned from the case.

V.

An appreciation of the Serum treatment as a whole.

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Chart of my mixed
case of Diphtheria
and septicæmia

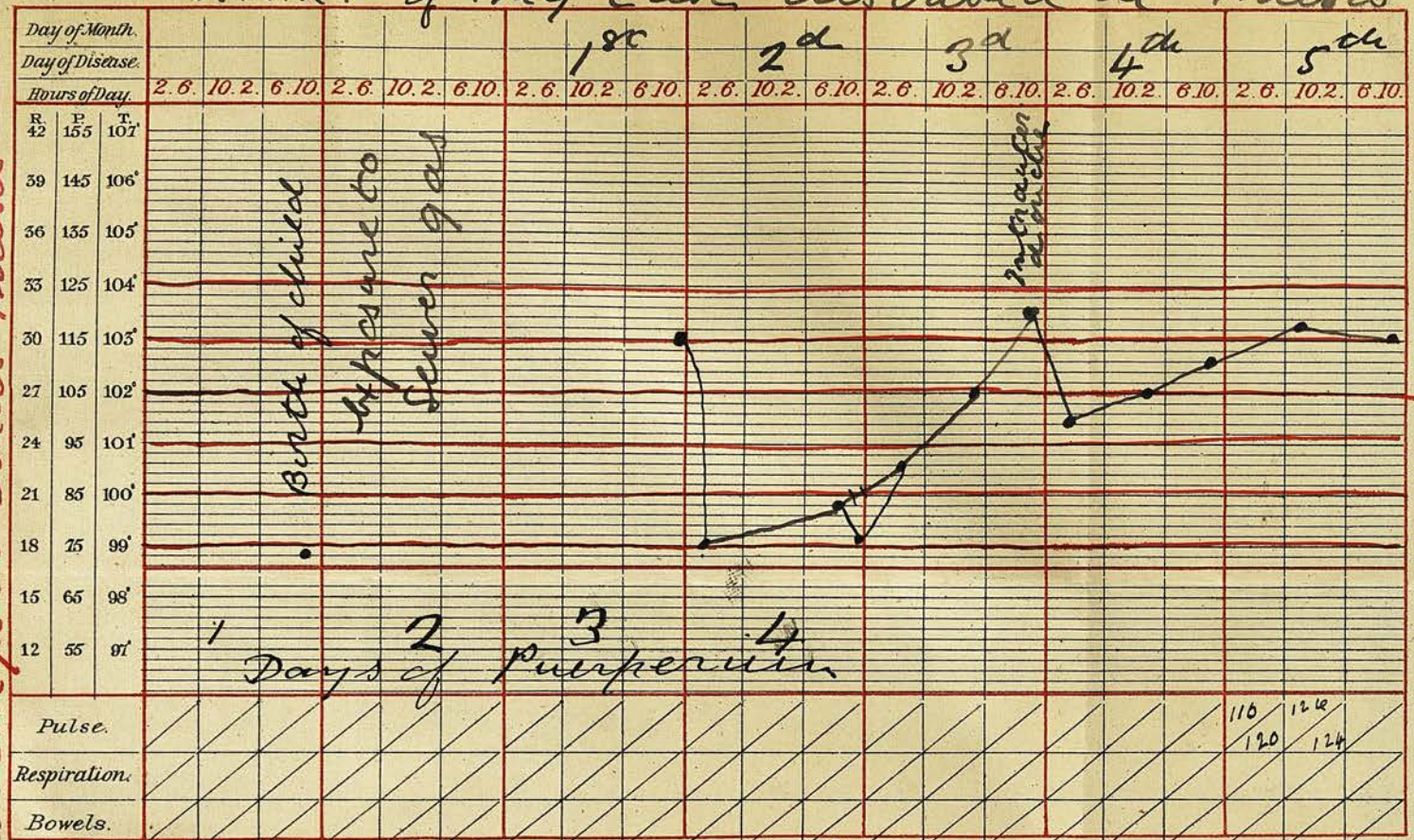
Chart of my case described in Thiers

Belongs to Dodds Thiers

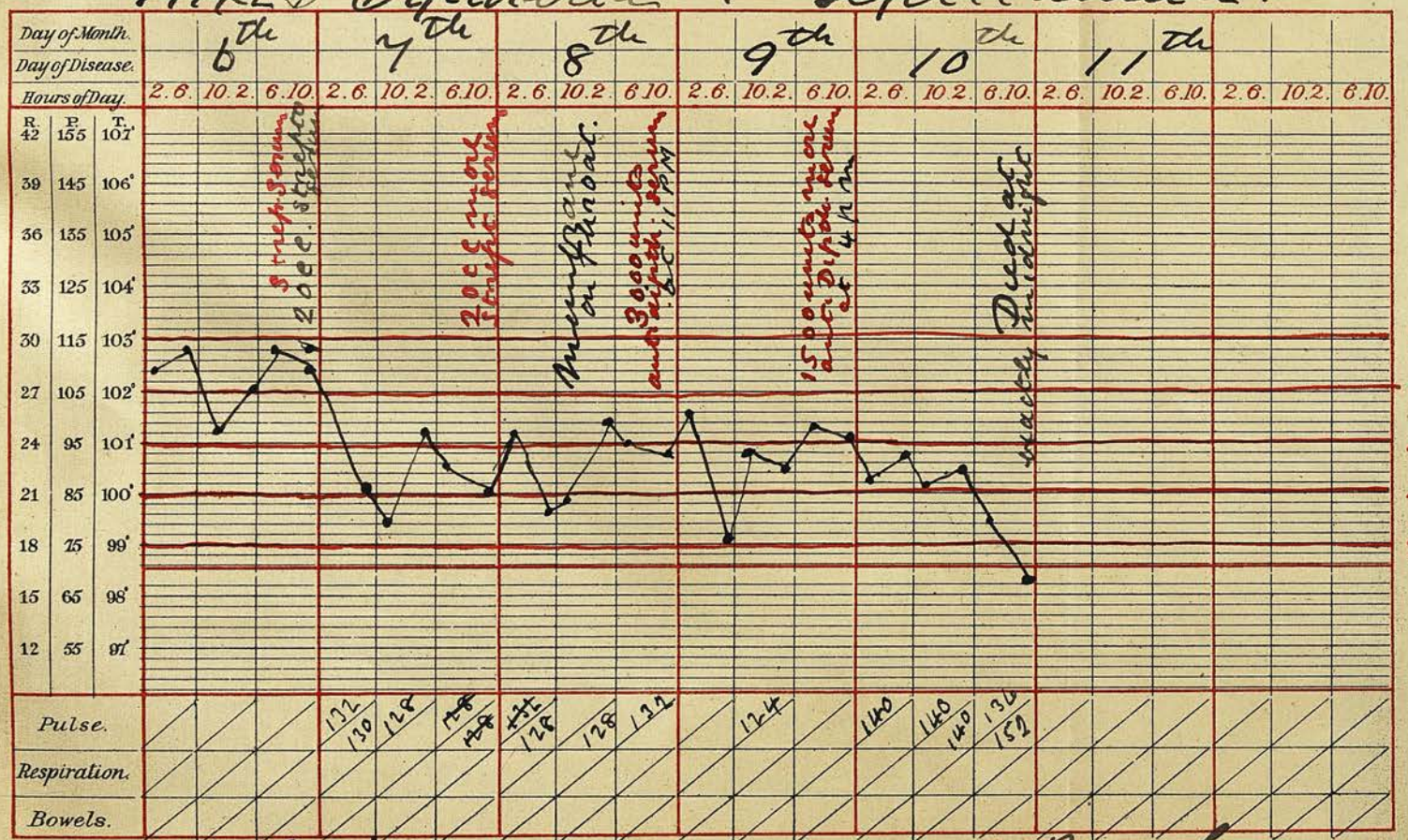
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Bt.

Name



MIXED Diphtheria & Septicemia.



M. S. Cleary 86 Warren Rd. Leyton

The case, which seems of considerable interest both in its clinical and bacteriological aspects is as follows,-

Mrs. L. C. aged 27 years II para, had an attack of puerperal septicaemia after her first confinement two years ago. It was apparently of a mild type, as it yielded to intravaginal douching with perchloride of mercury and the administration of alcohol and quinine.

At her second confinement one year ago patient had a severe attack of scarlet fever which was epidemic in the locality at the time. From this also, under appropriate treatment she recovered. These facts appear pertinent to the present case, in as much as they point to a special susceptibility to coccal infection and also contrast with her present illness in the way they yielded to the therapeutic methods adopted. In her present confinement she was attended solely by a midwife and was delivered of a male child after a labor lasting for 8 hours the presentation being normal. It was remarked that the child's head was a large one which probably

occasioned the cervical and perineal tears which will be mentioned later. The placenta and membranes came away easily and no membrane or piece of placenta was left in the uterus. On the day after her delivery a street gully (with a grating over it), which was situate immediately in front of her bedroom window and on the same side of the street, was cleaned out, and the mud piled in a heap by the side of the drain, and left there for 6 hours. Patient's bedroom window had been left open at the top while this was going on, till the offensive smell compelled its closure. On the next day, (the 3d. of the puerperum) patient's temperature went up to 103 F. at night but she had no rigor. On the 4th day the temperature dropped to 99 F. at night but on the 5th. day again rose to 103.6F. This temperature curve would appear to point to a reaction at the time the poison reached the raw surface, then an incubation stage and lastly the rise indicating the success of the microbes in gaining an entrance into the tissues and then developing their toxines.

On the evening of the 5th day when the temperature reached 103.6 I was called in

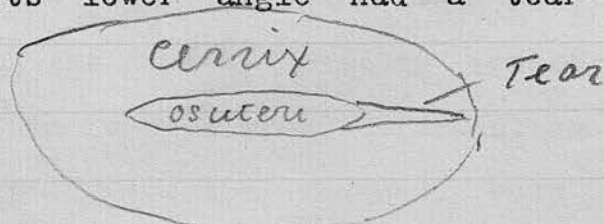
and found the patient in the following condition:-

She was slightly built, had a clear complexion with a hectic flush over both malar bones and had a pain-drawn anxious expression. She was in the dorsal decubitus, with both thighs flexed on the abdomen on account of the severe abdominal pain and intense tympanitis. Patient had profuse diarrhoea and the motions were particularly offensive. The flow of milk had stopped as had also the lochial discharge. The tongue was brown, cracked, and typhoid looking, and the pulse 140 per minute, and occasionally missed a beat. The abdomen, especially over the uterus, was very tender on pressure, and the abdominal pain intense. There was severe head-ache.

LOCAL CONDITION.

There was no rash except a few pustules on the buttocks. On inspection, the vaginal surface was seen to be discharging thick yellow pus and on the perinaeum, which had been torn for lynch, there was a typical puerperal ulcer, grey and sloughy. The usual lochial discharge was absent. On Bimanual examination the uterus was found to be antverted and its fundus reached to two inches from

the umbilicus. There was apparently considerable exudation in the periuterine tissues and the posterior fornix bulged down into the vagina. On passing the duckbill speculum the cervix was seen to look directly backwards. It was oedematous, bathed in thick yellow pus and at its lower angle had a tear



The os uteri was not patulous and there were no signs of any decomposing placenta, on dilating the os with Hegar's dilators under antiseptic precautions; but the whole lining of the uterus was bathed in yellow pus.

DIAGNOSIS.

I considered that I had to deal with a severe septicaemic case as evidenced by the temperature (103.6) pulse, diarrhoea and tongue, in conjunction with the local symptoms. It was evident that even on this, the third, day of the fever a large dose of the toxins had been absorbed causing the paralytic distension of the bowels, the feeble rapid pulse, and the other febrile symptoms.

TREATMENT.

Having given a vaginal douche of perchlo-

mercury
-ride of Hy. 1 in 4000, I cleared away the pus
from the cervix dilated it, and curetted the
uterine cavity and then gave an intra-ute-
rine douche of perchloride of mercury 1 in 2000.
Pure carbolic acid was applied to the puer-
peral ulcer on the perineal tear, and it was
then dusted with iodoform and iodoform was
blown up the vagina and an iodoform bougie
inserted in the uterus. Turpentine stupes
were applied to the abdomen, cold sponging
every two hours over the whole surface of the
body was ordered and 3 XII of brandy ordered
to be given in the twenty-four hours with a
milk diet.

Internally, I gave a mixture containing
^{omat}
 my X of of opii and ~~anesthetics~~ in each 4
^{anest}
 hourly dose and a draft of gr.XX quinine to
 be repeated in the morning. On the next day
 (fourth of Disease) the temperature had dropped
 to 101.5 and the general condition of the
 patient had improved. The tongue was not so
 dry or cracked, the head-ache was greatly
 lessened but the abdominal tympanitis was still
 extreme as was also the diarrhoea. The pulse
 had come down to 116 per minute. I gave

here another intra-uterine perchloride of Hy. douche and continued the anti-pyretic treatment. I still regarded the case as one of the most severe septicaemic type and trusted to the vigorous local and general treatment. On the fourth evening of disease the temperature went up to 102.5 in spite of continued vaginal anti-septic douchings and another intra-uterine perchloride douche. The opium and quinine (in 20 gr. doses night and morn) were continued. On the fifth day of disease temperature, went up to 103.2F. and on passing the Sims' speculum the cervix was seen to be again covered by yellow pus and the posterior fornix showed a yellow loose membrane. This was all cleared away with the curette and the wound painted with Iodized phenol. The intra-uterine perchloride douche (now 1 in 4000) was continued night and morning till the ninth day of disease and the quinine and opium in smaller doses was continued till the eighth evening.

On the sixth day temperature was 102.5 and where the cervix and vagina had been cleared of membrane it had again grown and was extending down the posterior vaginal wall. The tympanitis still continued but the diarrhoea had abated. On the evening of the sixth day of

disease I injected 20 c.c. anti streptococcic serum under the skin in the right iliac region , having carefully cleaned the skin with soap and water, ether and 1-20 carbolic. The next morning it was evident that a great improvement had taken place the temperature dropped to 99.5 F. the tongue had cleaned and had a peculiar strawberry look, and the patient was quite cheerful and expressed herself as feeling much better but the temperature went up at 2 midday to 101.4 it dropped however later in the evening and oscillated a clear 2 degrees lower than it had ever been before while the semi-delirious condition of the patient at once ceased. On the 7th evening of the disease I injected into the skin on the opposite flank another 20 cubic centimetres of anti streptococcic serum and the result of the second injection was very marked. The general condition remained apparently the same as after the first injection but the local symptoms were greatly changed.

On the morning of the 8th day the pus, which had been abundant in the vagina and on the cervix until the first injection, had now disappeared entirely the puerperal ulcer on the perineal tear had healed but the

vagina was coated with a membrane which was now dense and chamois-leather looking and which on detachment left a raw bleeding surface.

The pus had ceased to discharge from the cervical canal and the same tough yellow membrane appeared to extend within the uterine cavity. By this time the tympanitis had ceased as had also the severe abdominal pain

but the uterus still reached to within two inches of the umbilicus. But the symptom which caused me most apprehension was that

both tonsils were coated with a similar tough creamy membrane though on the day before the

patient had suffered no discomfort from her throat. I regarded the growth in the vagina

and that on the tonsils as being specifically the same ~~namely~~ practically pure Diphtheria

cultures. On this diagnosis I promptly acted to the best of my power. I injected under

the skin between the scapulae 3000 Behring units of Diphtheria antitoxin with due anti-

septic precautions. I douched the vagina with perchloride of mercury 1-4000 cleared away all

the membrane from the vagina and cervix and with a hydrostatic douche can and a Budins

tube douched the uterus with 2 ounces of Liquor Ferri Perchlor fort, which I poured

in to the tube first so that it lay just above the top of the Budins tube and then washed it out with a weak solution of the same chemical I then painted the vagina with the strong solution of iron, and gave the patient m X of Liquor strychniae and Iron every three hours and an acid gargle hoping that it would inhibit the growth of the diphtheria bacilli which I knew flourished best in an alkaline medium. I stopped the vaginal douchings and increased the quantity of brandy which the patient took from 12 oz to 18 oz in the twenty-four hours. I kept some of the membrane from the vagina for further examination.

On the 9th morning of the disease I called in ~~Dr. J. B. Edson~~ (Dr. B. Edson) a medical neighbor (~~who was practicing near me~~) to criticize or confirm my diagnosis of the throat condition confirmation was however superfluous, as the membrane now extended down both nostrils and appeared at the anterior nares, covered the back wall of the pharynx and pillars of tonsils and extended over the uvula and soft palate. Mr. Gregorson agreed with my diagnosis and we then examined the vagina. The membrane there had not grown again and

the uterus was well contracted and the abdomen showed no tenderness on pressure. A small piece of membrane in a crevice behind the posterior lip of the cervix still remained and my colleague a practitioner (who has had diptheria himself) expressed himself positive that the vaginal membrane was diptheritic from its smell. On this (the 9th) day still, the patient's condition was greatly aggravated pulse 140 soft and at times imperceptible now and then missing a beat. Respiration hurried lips blue and altogether ^{the case looked} hopeless. However, I injected another 1500 units of anti-diptheritic serum and continued the strychnine and gave 20 oz. of brandy in the 24 hours.

On the 10th day uncontrollable diarrhoea came on in spite of starch and opium enemata. The patient was collapsed, cyanotic but still conscious; there was again great abdominal tympanitis but no tenderness and she died at midnight apparently from collapse of heart failure.

All through the 10th day I gave strychnine hypodermically which alone kept her alive. Just before death the patient's pupils were widely dilated and for two hours

previously pulse was 152. Such was the case which appears of exceptional interest from the varied problems, clinical, bacteriological, and therapeutic which it presents and which I hope shortly to consider . The patient had been attended at her confinement by a certificated mid-wife only and it was not till the 3rd day of the disease at midnight that I was called in. This appears to be topical, when one thinks of the present agitation for replacing qualified practitioners by mid-wives whose vast knowledge of sanitation will no doubt fully qualify them to deal with cases involving the grave problems that this one presented. The case entailed on me 5 hours work a day for 7 days at this patient alone, made me give up all my *obstetric* engagements for the time being and added an intense anxiety to the cares, by no means light, of a hardworked practitioner. The issue was foregone from the 8th day and my only consolation is that the case fell into the hands of one capable of appreciating its fascinating beauties as a pathological sphinx.

TRAGOEDIAE PERSONEA.

II. THE CAT.

During the patient's confinement & untill the 4th day of her disease, her favourite cat had occupied the room with her. It was ailing and out of condition and had a cough. Directly I saw it in the room, I gave orders for its passage to amenti with the aid of a lethal dose of prussic acid. It may be asked, "Que diable fait-il dans cette galère" but I hope later to show that it played no small part in the causation of its mistress's death. No doubt a licensed mid-wife would also have been *qualified* by her training to see the relationship of the cat to the patient's disease!

III. THE BABY.

The new-born baby lay in its mother's bed till the 3rd day of the mother's fever when I saw it and sent it away to a neighbour. Its umbilical cord came off on the 2nd day of the mother's fever and the 3rd of the baby's birth, and after 48 hours the navel was the seat of a grey sloughy ulcer with spreading margins as big as a

penny surrounded by dense induration. It was covered over its whole body with a rosy rash looking like erysipelas and had three abscesses on its fingers as big as a hazel nut each. It died on the fifth day, i.e. after 24 hours of actual disease, and 72 hours after infection, comatose, with signs of meningitis. I gave it stimulants in such doses as a baby could take and applied anti-septic compresses to the navel. This seems to represent an inoculation at the umbilical wound with the mixed injection, the grey ulcer being due to the diptheria bacilli and the rash, abscesses and meningitis to the streptococci. The Child's rapid death shows the intense virulence of the maternal infection and gives us, unfortunately, the requisite experiment which was however in this case an observation as the term is used in inductive logic.

IV.

Two of the attendants on the patient got membranes on their tonsils after her death but as the antitoxin of diptheria was injected on the first day they both recovered perfectly and the membrane cleared away.

A review of the case with considerations.

I. As to the cause and source of the infection.

(a) Among the predisposing causes the first place must be assigned to the patient's special susceptibility to coccal infection as evidenced by the attacks of Puerperal Sepsis and Scarlet Fever which followed each of her two previous confinements. This was entirely an individual predisposition and shows that any immunity produced by previous coccal infection successfully vanquished is only transitory in its nature.

(b) The special susceptibility of lying-in women, as such, to microbic infection had doubtless largely contributed to the acquisition of the disease. The question "To what is the special liability of puerperal women to microbic infection due" is of vast importance. When we find writers like Sir W. Playfair writing as follows: (Allbutt's system of medicine 1896 page 639 volume I in his article on puerperal septic disease) it is evident that the last word on this subject remains to be said:-

" That strict antisepsis of hands, in- "
" struments and the like is of primary im- "
" portance in mid-wifery practice, has been "
" clearly proved by the remarkable results "
" which have followed its introduction into "
" Lying-in Institutions in all parts of the "
" world. No satisfactory explanation, however, "
" has as yet been offered of the extreme "
" susceptibility of puerperal women to the in- "
" fluence of pathogenetic micro-organisms. "
" It is clearly not their absorption through "
" lesions of continuity in the genital tract "
" which is alone at fault; such lesions con- "
" tinually occur in women who have undergone "
" operations about the vagina and uterus when "
" micro-organisms must be present as they are "
" after delivery and yet nothing analogous "
" to puerperal fever occurs. There must there "
" fore be something besides the mere presence "
" of micro-organisms something which is spe- "
" cial to the lying-in woman, which predis- "
" poses to this type of infection; what is "
" it which causes her structures to afford so "
" favourable a soil for the growth and de- "
" velopement of such micro-organisms as may "
" have gained access to them? In the answer "
" to this question the explanation of the "

" proclivity of lying-in women to septic " " disease will no doubt be found but as yet " " no very satisfactory answer can be given. " " The hydraemic condition of the blood existing " " during pregnancy and the fact that immediately " " after delivery a quantity of excrementitious " " matter is absorbed into the circulation during " " the process of involution suggest themselves " " as possible factors in this susceptibility, " " but further investigations in this direction " " are still much needed." *Quotation ends.*

This then is the problem we have to solve:- To what is this special proclivity of lying-in women to septic infection due? The answer, I believe, has been found by observation and experiment.

Observation has long ago shown that the tissues of over driven and hunted animals are specially prone to septic processes. To instance only one example, animals driven too far and too hurriedly to the slaughter house are found to decompose more rapidly than similar animals which have made the same journey in a more leisurely fashion. Hares, again, after being courted decompose more rapidly than others that have been shot after a short run. But the results of experiment

are even more convincing. The normal white rat which possesses a high degree of immunity from anthrax has been proved by M.M. Charrin and Roger to be deprived of this immunity by fatigue. A rat, after being made to work a - treadmill in a cage was inoculated with an anthrax culture when it had been thoroughly fatigued, and died from anthrax, whereas a similar white rat, differing only in not being fatigued, did not take anthrax on being inoculated with it. (Charrin and Roger in La semaine Medicale 1890 No Iv quoted but in a different connection by Dr. Kanthack in Allbutts Medicine Volume I page 548) The same experiments have shown that loss of blood will deprive a naturally immune animal of its immunity. The vital connection between these proved facts and the special susceptibility of puerperal women to septic infection does not appear, at present, to have received adequate recognition. What animal can be in a more thoroughly fatigued condition than a woman after a prolonged labor or, for the matter of that, after a labor which would be considered normal in its duration? what is a more frequent concomitant of labor than the loss of blood in the 3rd stage? we see, then, that these two factors,

fatigue and loss of blood which have such an intense influence in causing susceptibility to microbic infection in animals are invariably present, to a greater or less degree, in every puerperal woman. No doubt other factors also are involved, such as traumatic lesions in the vagina and uterus and these lesions were found in the present case and will be considered under their proper head but that the fatigue and loss of blood explain the special liability of puerperal women to septic processes cannot be doubted. True, the cocci normally (as far as we know yet) present in the vagina may play some part in the process as may the lesions but the lesions and cocci must often be present after operations on the female genital tract, yet we get no "puerperal fever" till these other factors, fatigue and loss of blood are super-added. Such being the case, the paramount importance of lessening these two causes of puerperal disease by all means in our power is driven home to us.

By early anti-septic instrumental interference when the labor is becoming unduly prolonged, and by even more scrupulous care to prevent needless loss of blood before, after, and during the expression of the placenta the

number of cases of Puerperal Fever, which, (in spite of the wide spread belief in anti-septics), still remains too high, may, I believe, be greatly lessened.) The point is of vast importance and I should wish to dwell on it but life is short and I must pass to the 3rd cause of the infection in this case viz:-

The traumatic lacerations in the cervix and the vagina.

These consisted in a perineal tear one inch long and in a cervical tear about $\frac{1}{2}$ inch long and appeared to be the sites where the microbes first made their attack as evidenced by the puerperal ulcer on the perineal tear and the purulent membrane on the cervical tear. What appeared to be a third traumatism, to all intents and purposes was the douching by the nurse with one carbolic during the first three days of the puerperum, which would doubtless lower the vitality of the vaginal mucous membrane and thus favour the growth of the microbes which certainly gain an entrance in these first 3 days. It is a question whether streptococci normally present in the vagina might not remain non-pathogenic till the mucous membrane had its vitality lowered. Certainly the fact (quoted by Playfair in Allbuts

Vol.
system I page 658) that "Leopold and others,
on abandoning the use of anti-septic douches
before and during labor, found, that the number
of febrile cases in their practice was lessened
considerably," would appear to point to this
conclusion.

th.

IV.

CAUSE OF THE INFECTION.

The intoxication by Sewer Gas referred
to in the history of the case. There may be
a difference of opinion as to the part played
by this factor. Did the streptococci and dip-
theria bacilli actually come by aerial con-
tagion from the Sewer, (which would elevate this
cause to the position of the "Causa Causans"
of the disease,) or did the intoxication by Sewer
Gas so lower the vitality of the patient as
to allow the streptococci (perhaps already
normally in the vagina) and the diptheria
bacilli, (from the cat), to gain a nidus in the
tissues. The latter supposition is the one I
favor, as it has not been shown that Sewer
Gas contains pathogenic microbes such as strep-
toccoci and Diptheria bacilli, in fact what is
known about the bacteriology of Sewer Gas
shows that saprophytic organisms and moulds
with some micricocci

are its chief flora. I incline to rank the Sewer Gas as a predisposing cause, like the 3 previous causes, and to look for the real origo mali in streptococci normally present in the vagina and Diptheria bacilli (and possibly streptococci derived from the cat.

V.

THE CAT.

(Which in this case was neither harmless nor necessary) I regard as the host of at least the Diptheria bacilli. We have the fact that the cat was, and had been for some time previous to the patient's confinement, ailing and out of condition with a cough and mangy skin. None of the attendants had recently been with any case of diptheria, or had it themselves and in the absence of any other source, I am disposed to assign to the cat a large share in its mistress's illness; we know from Dr. Klein's researches that cats are liable to a form of ^{Pneumonia} broncho pneumonia which is characterised by the presence of bacilli indistinguishable from those found in human diptheria, and that "he concludes that cats are susceptible to human diptheria and that in them a disease occurs, centered chiefly in

the lungs, which is akin to the infection in man." Cases are recorded in which human diptheria "has followed on similar diseases in cats", and that cats have acquired diptheria from man, Dr. Thorne Thorne (in Allbutt's system of Medicine page 110 Volume I) states that "Dr. Bruce Low, in reporting to the Local Government Board on an epidemic of Diptheria at Enfield, expresses the opinion that a disease resembling human diptheria which he met with in the cat was in all probability first contracted from human diptheria then communicated from cat to cat and then transferred again from the cat to the human subject." The cat in my case might easily have acquired diptheria from man as Diptheria is almost endemic in Leyton from the crowding and marshy soil. So far, our paper has, we trust, been fairly easy reading, but we must endeavour to still further rend the veil from the face of this's and now pass to consider.

B.

The nature of the infection with an estimation of the relative part played by each species of microbe in the causation of the
clinical
chemical features of the case.

clinical

NATURE OF THE INFECTION.

There can, I think be little doubt that in this case abinitio, we had to deal with a double infection by streptococci and Diphtheria bacilli. The streptococci were derived either from the Sewer air, which has been proved to contain micrococci, or from the vagina itself which (Playfair in Albut's system) contains streptococci during pregnancy and before delivery. The diphtheria bacilli doubtless came from the cat. This is the conclusion I have arrived at from a consideration of the symptoms and cause of the patient's disease and from the unfortunate unconscious inoculation of the child. The prima facie view of the case was, however, that it was one of severe septicaemia alone I shall never cease to regret that I allowed my own judgment to be over-ridden by the opinions of the elder authors, who mention a so-called pseudo diphtheritic membrane as occurring in septicaemic puerperal disease. The fact that in cases proved to be purely due to streptococcal infection loose membranes are observed (Smiley in Albut's system Galabin Playfair etc) further misled me. The character of the membrane also influenced me, as for the first 6 days, and,

in fact, till after the injection of the anti-streptococcic serum, the membrane in the vagina and on the cervix was loose and purulent and not suggestive of diphtheria, whereas after the 2nd anti-streptococcal serum injection it lost these characters and became dense, non-purulent and more firmly attached to the under-lying tissues. I believe, I repeat, that there was from the first a mixed infection, but till the streptococci had been killed out by their specific anti-serum, the diphtheria could not be recognised, as the membrane presented no characters and that could not be justly ascribed to the polymorphic lesions of the streptococcal infection. To use a ~~handy~~ simile, the case is comparable to a field on which grows a mixed crop of oats and clover and only on removing the oats (= the cocci) is the clover (= the diphtheria) discernible. The intimate admixture of the microbes in the membrane makes the comparison a not entirely apt one but in the main the cases are similar. The biological features of the growth first aroused my suspicions as to the real nature of the case as those parts from which I had removed the membrane and applied powerful anti-septics, such as iodized phenol, showed in the

course of two days an extension of the membrane. On reviewing the case, I see that the fact of the temperature being pyrexial 103.5 in character rather than hyper-pyrexial as in most cases of severe septicaemia should have arrested my attention, but I ascribed the absence of hyper-pyrexia to my anti-pyretic treatment (Quinine and sponging) and to the intra-uterine antiseptic douche rather than to the action of the products of diphtheria bacilli in keeping the temperature only moderately elevated. Another alternative of course suggests itself, that the primary infection was purely streptococcal and that the diphtheria was super-added at a later period. This view is supported by the *Known* fact, that, in many cases of pharyngeal and tracheal diphtheria, a streptococcal infection is antecedent, and apparently predisposes, to the subsequent true diphtherial infection. We would only call to mind in this connection the well-known fact that cases of ordinary *tonsillitis* (whatever that may be), appear to predispose and lead up to true epidemics of diphtheria and the additional fact that in tracheal diphtheria, the streptococci are found at a lower level in the trachea, appar-

ently preparing the soil for the subsequent diptherial growth. However the fact that in an early stage in the history of the case, the child received a double infection of diptheria and of streptococci, as evidenced by the ulcer on the navel which was typically diptheric and the abscesses and rash being equally unmistakable streptococci^{origin} would seem to point to the infection being from the first a mixed one. The blame for my non-recognition of the real nature of the case must I am afraid be laid at the door of the system of picking out certain features of the case arbitrarily and calling them typical and on them building a diagnosis, neglecting in the meanwhile, symptoms, no doubt less obvious which do not, at once fall into line but are, at least of equal importance as regards the recognition of the true nature of the case. No doubt the system of typical cases simplifies matters but is not the simplification too often at the expense of truth? It is the borderland cases, the cases where two apparently different diseases overlap ~~are--there~~ that really test a man's powers and I am convinced that the text-book method of raising certain symptoms to the

rank of typical ones which the consequent neglect of other symptoms apparently unimportant has to answer for many mistakes in treatment. The Procrustean method cannot be applied to nature much as we may desire it, she only laughs at our arbitrary limitations. It is only like Achilles by repeated contact with facts or earth as the fable has it, that we gain strength, and how often has one overlooked fact the ruin of many a fascinating a theory.

The truth, that a former graduate in medicine, distinguished perhaps more in literature than in medicine, viz. Francois Rabelais of the University of Montpellier, was never tired of urging, not to look on life through one hole, has lost none of its force in its passage down the ages and is borne in upon us more and more in these days of narrow specialism.

But to return to our case. We conclude that it was due to a mixed infection and must now endeavour to assign the various symptoms to their true cause.

1st. The Streptococci.

These certainly caused the purulent discharge from the vagina, cervix and uterus

in the mother since after the infection of the anti-streptococcal serum, the pus ceased doubtless ^{owing} any to the bactericidal action of the serum which would be powerless against organisms of a different species. There can also be little doubt that the profuse and exhausting diarrhoea, which was such a prominent feature (with the associated tympanitis) in the first stage of the case, was due to the toxins of the same organisms.

THE ELEVATION OF THE TEMPERATURE.

So far as this was above 102 degrees F. was doubtless also due to the streptococci. When all the other symptoms of coccal infection had disappeared as the result I believe of the anti-streptococcal serum injections the temperature never rose above 101 degr. F. except on one occasion which may fairly be ascribed to the re-action from the anti-diphtheritic serum. As it occurred ^{within} in the

8

hours

^{of the injection}
^{parched}

The cracked and ~~pinched~~ tongue, headache and delirium occurred simultaneously with the rise in temperature and ceased when the temperature fell, the tongue in particular becoming strawberry like after the first anti-streptococcic serum injection. These symptoms

also are therefore to be ascribed to the streptococci. The exudation in the parametric tissues also disappeared after the specific serum had been injected and was likewise due to the streptococci. On the 8th day there were vague pleuritic pains but no physical signs or other symptoms of purulent pleurisy, which I had suspected.. In fact the absence ~~of such a static streptococcus~~ ^{metastatic streptomyces} was a feature in the case and may be ascribed to the injection of the antistreptococcic serum, as in puerperal septicaemia, metastases are usually a late manifestation. Turning now to the case of the child who died after lying in the same bed as the mother who had at the time a purulent discharge from the vagina and a loose membrane on the cervix .

The erysipelatous rash on the child was due to the cocci. The question here arises can a pus forming coccus when not related ^{unconnected} into another subject produce a rash. I reply "most certainly" and quote from Drs. Muir and Ritchies Manual of Bacteriology page 156. Petrushky ~~and~~ recent publication, 1896, has shown that a streptococcus cultivated from pus can cause erysipelas in the human subject. He obtained a pure culture of a streptococcus

from a case of purulent peritonitis secondary to parametritis, the patient never having suffered from erysipelas. By inoculations with this culture he produced typical erysipelas in two women suffering cancer."

point
~~front~~ This experiment is decisive on the at issue.

Continuing our review of the baby's case the abscesses on the fingers next claim our attention. There were streptococci *mycoses* of a metastatic nature strictly comparable to the metastatic abscesses observed in rabbits after inoculation with virulent streptococcal cultures.

The septic meningitis which was the immediate cause of the baby's death was also *of* streptococcal origin. *7* The fact that the baby died in 72 hours after infection proves that we had to deal with a virulent growth of cocci and the wonder to me *is* that the injection of anti-streptococci serum on the sixth day of disease should have had such a marked influence in inhibiting the streptococcal infection in the *mother* ~~matter..~~

B. Symptoms due to diphtheria bacilli and their toxins.

(1) The developement of membrane on these *off*

parts of vaginal and cervical mucous membrane
which had their vitality lowered by strong
anti-septic applications such as iodized phenol

This is characteristic of diphtherial infection and was the first symptom which caused me to suspect diphtheria. Löffler has shown that healthy mucous membrane can resist diphtherial invasion, whilst injured or ~~abraded~~ ^{eroded} mucous membrane offers a ~~nidos~~ ^{nidus} to diphtheria bacilli.

(2) The pyrexial type of the temperature in
the later stages of the disease.

This again is symptomatic of diphtheria where, as is well known, the low temperature is no criterion of the severity of the infection. No doubt, the diphtheria toxins, from the first, kept the temperature from becoming markedly hyper-pyrexial.

(3) THE MOTHER'S THROAT.

The fact that the throat and nose were the seat of unmistakable diphtheria is important and interesting, that the disease in the throat was diphtheria I take to be indisputable, since no other infection will in 24 hours cause a membrane to appear at both anterior nares and in addition Dr. Gregorson
Mr. B. Edin. confirmed my diagnosis of the

throat ~~lesion~~ ^{lesion}

The question that remains is:- Did the bacilli reach the throat through the air or through the patient's blood? Either answer is possible, it is proved that this diptheria in the ^hpharynx may cause diptheria in the larynx without an actual extension of membrane over the intervening mucous membrane, probably by insufflation of the bacilli during inspiration. The patient may, in my case, have acquired the pharyngeal disease by aerial confection from the vagina by the pillows which were placed under her hips whilst the vagina membrane was cleared away, the same pillows being placed under the head afterwards, before the real nature of the case was known. Or, on the other hand, the ^{bacilli} may have been carried from the vagina to the throat by the blood or lymph streams. This seems the more probable when we consider that fatal cases of so-called puerperal fever often show throat infection in their last stages and I believe the germs were in this case conveyed to the ^{throat} ~~toxins~~ by the blood. This necessitates the presence of diptheria bacilli in the blood or lymph, but we know that in severe cases of diptheria the bacilli are not, as is

often asserted, confined to the local ^{lesion} ~~lesion~~ but are to be found in the lymphatic system and spleen (Muir and Ritchie page 333.)

IV. The diarrhoea in the final stage of the disease may have been due to the diphtheria toxins. Thus in rabbits inoculated with a large dose of diphtherial toxine "the intestines are found to be distended with fluid and there may be diarrhoea (Muir and Ritchie's Bacteriology page 341). This may of course be due to the paralytic effect on the intestinal nerves of exhaustion from the virulence of the poison. In the baby the ulcer at the navel had all the characters of a diphtherial membrane.

The fact that the anti-diphtheritic toxine did not cure the patient is no proof that diphtheria is not present, as, if my interpretation of the case is correct, the Diphtheria Anti-toxine was only injected on the 8th day ^{of disease} when it could not be expected to cure considering the large dose of toxins that must have already been in the blood from about 6 square inches of membrane in the vagina and 2 square inches in the throat besides what was in the nose and we know that the dose of anti-toxine must be in-

creased enormously if the inoculation of toxins or bacilli is made long previous to the anti-toxic injection if the case is to be saved. The fact that membranous sore throats having all the character of diptheria ^{arose} with- in three days of the mother's death in an attendant and a child nursed by her and that these throats were promptly cured by the injection of anti-diptheritic serum (3000 units) goes still further to prove the presence of diptheria.

These would appear to be the place to consider the attempt to decide the nature of the case by a bacteriological examination of the membrane which was removed from the vagina and which had all the characters of diptheritic membrane as the coccal element in it had been inhibited by the anti streptococcal serum. I submitted the membrane to the director of Burrough's Wellcomes Physiological Laboratory for a report. Unfortunately, the staff of the laboratory were away for their Easter holiday when the membrane was sent, and it was therefore not examined for three days after removal. This would not have interfered with the recognition of the organisms contained in it, had I not douched the

membrane with perchloride of mercury before removing it from the vagina as I did not like to operate without the use of antiseptics. The antiseptics which failed to check the growth of the microbes whilst the membrane was connected with the tissues appeared to have killed all the organisms when left in contact with the membrane in a test tube for the 3 days that it awaited examination. Anyhow, the expert reported that after making stroke cultures on suitable media with portions of membrane and then incubating them. No growth was seen for 48 hours which excludes the presence of diphtheria. Sterile bouillon to which another piece of membrane had been added showed no tendency after being incubated for 48 hours. A peculiar white waxy looking growth made its appearance on the serum tubes after 72 hours but it was probably due to some contamination. It grew on different media in a coccal and bacillary form and the bacillary form had many of the characters of a diphtheria bacillus but was not identical with the Klebs Löffler bacillus. At my suggestion, experiments were carried out with a view to finding whether the organism was pathogenic. A bouillon subculture was made

from the growth on serum and three c.c. of this was injected with anti-septic precautions under the skin of a guinea pig. Beyond some local swelling which only lasted for 4 hours no effect was produced and after 72 hours the guinea pig was as well as before the injection 3c.c. was a large dose and had the organism been pathogenic, should have caused marked symptoms in this ~~time~~^{time}. As none developed. I concluded that the organism was non-pathogenic and probably a contamination. This want of bacteriological confirmation of my diagnosis was ^Sdisappointing but quite explicable I think, by the fact that the membrane had been doused with perchloride of mercury before removal, ~~as~~^{as} the patient's wellfare was my first consideration and the identification of the organisms a secondary matter. The fact that 2 square inches of diphtheric^{etc} membrane in the throat, apart from its mechanical action in impeding respiration aggravated the patient's general condition far more than 8 square inches of similar membrane in the vagina is interesting and I think admits of an easy explanation when we consider that the absorptive powers of the tonsils are much greater than the absorption from the vaginal and uterine ~~mucous~~^{asa}.

The temperature lost its intermittent character and the pyrexia became of a continued type whilst the pulse changed at once for the worse when the throat was attacked.

The value of the Therapeutic measures adopted in the case.

(1) The general anti-pyretic measures such as sponging with tepid water though they doubtless did a certain amount of good, do not seem to call for any special consideration.

(2) The Quinine which was given in 20 gr. doses night and morning till the free effects of the drug were produced had ~~a~~^{it} been believed marked action in increasing the phagocytal powers of the leucocytes and I believe that the patient's escape from any metastatic streptococcal^{mycoses} was due to this action of the quinine. It would certainly tend to prevent the developement of streptococci in the blood away from the local ~~lesion~~^{focus} but it could have no action in combatting the symptoms produced by the toxins secreted by the specific organisms. This fact must always be borne in mind as unless we can prevent the formation of these toxins or neutralize their virulence we are comparatively powerless in dealing with a severe pathological process due to the growth

of microbes and the consequent secretion of toxins by them.

3d Therapeutic measure.

The local use of anti-septics. The value of this treatment depends, I believe entirely on the nature of the disease. In a case of pure sapraemia, for instance, due to the retention within the uterus of a portion of decomposing placenta and where the fever is due almost entirely to the toxins and ptanaines secreted by the microbes growing on a decomposing material, if we remove the portion of placenta and then douche the uterus with an anti-septic lotion of sufficient strength (such as Hyd. Perchlor[?] or LM. 2000 or carbolic 1-40 or iodine in watery solution) we can at once either affect a cure or get the disease entirely under control. Where, however we have deal with a case of pure septicaemia with the organisms flourishing within the body we can hope for no such gratifying results. I shall refer later to several cases of sapraemie puerperal disease where intrauterine douchings, with general anti-pyretic treatment at once effected a cure.

Now if there is lesson more than another which this case has taught me, it is, the absolute futility of hoping to cure true puerperal septicemia by anti-septic applications. In this case, the pus still flowed from the vagina and cervix after carefully administered vaginal ^{uterine} perchloride of mercury douches and though one cleared out the Augean stable for the time being, the streptococci and diphtheritic bacilli still flourished. I should like to quote in this connection from an article by Miller (American medical ~~gynaecological~~ and journal Nov. 1894) he concludes that in puerperal cases, irrigation and anti-septics destroy the nutrition of parts when continued, and by furnishing, increased moisture improve the field for the development of micro-organisms. My experience, in this case, supports his view as the powerful anti-septics employed appeared to be entirely useless in inhibiting the growth of the microbes if we except the drop in temperature of $\frac{1}{2}$ a degree after the first intra-uterine douche. In fact the more powerful the anti-septic the more harm did it appear to do. Thus the application of pure carbolic and tinct iodi (mixed)

to the surface from which the loose spongy membrane had been removed seemed actually to favour the growth of the germs and I have no doubt this was due to their caustic action in lowering the vitality of the tissues. There is, I fear, now -a -days too great a tendency to regard an anti-septic as a fetish, capable of stopping the growth of a microbe, without regard to the specific biological habits of the microbe in question. Anyhow the only antiseptic that did any good in this case was the Perchloride of Iron in strong solution.

This succeeded where perchloride of Hg, Carbolic, Creoline Iodoform and Iodine had all failed in checking the growth of the diptheritic^{ic} membrane ;after I cleared away the 6 square inches of membrane from the cervix and vagina and painted the underlying tissues with strong perchloride of Iron solution, having at the same time, given intra-uterine injection of the same salt, the membrane never grew again in the vagina except one little patch that had been hidden behind the cervix and thus escaped treatment and this patch remained in spite of the injection under the skin of anti-diptheritic^c

THE SPECIFIC ANTITOXIC AND ANTIBACTERIAL

SERUMS.

These, though powerless to prevent death in the face of the throat complication did more than any of the agents employed in helping to prolong the patient's life. I do not propose to enter into the subject of the preparation and mode of action of the serums in producing their curative and immunizing effects but will pass at once to consider the efficacy of the sera in the present case.

Now if ever there was a test case this was one. The ordinary therapeutic measures, drugs antiseptics, hygiene and diet, applied, I submit with deference, not unskillfully, failed entirely to cope with the disease and had I been restricted to the use of the ordinary methods of treatment, the case would, I believe, have died long before it did. Here then, was a test case. The question is how did the sera come out of the trial. I reply, extremely well. I shall first consider the action and value of the

A. Antistreptococcic serum.

This must necessarily be bactericidal in its action as the Toxines of the streptococci have not

yet been isolated and it is therefore useless at present to try to prepare an antitoxic streptococcal serum. Did it then kill the streptococci? Now it must be remembered that in this case the streptococci had a long start of the serum as I did not see the case till the 3rd day of the disease when it was already well established and being doubtful at first whether it was not a case of sapraemia, I employed first of all the classical treatment which I had found, in previous cases to be quite efficacious in combatting sapraemic infection

Further, unavoidable delay occurred in procuring a supply of the antistreptococcic serum and the serum therefore was only injected on the 6th day of the disease. This made the task of the antistreptococcic serum all the harder. What then was the effect of the injection of 20 C.C. of serum. An immediate drop in the temperature of 3 degrees and a subsequent oscillation of the temperature about a point quite $1\frac{1}{2}$ degrees lower than it had ever been under the previous classical treatment.

Further the injection of an additional 20 C.C. of antistreptococcic serum on the 7th day of the disease not only controlled

the temperature at a lower level but caused the entire cessation of the purulent vaginal and cervical discharge which the anti-septic douching had failed entirely to stop. The reason why the temperature approached the normal but never reached it must I believe be ascribed to the concomitant diphtheritic infection which would tend to keep the temperature osculating about 101° F. Subsequent and I believe, consequent on the 3rd injection of antistreptococcic serum the abdominal tympanitis and severe abdominal pain with the associated foetia diarrhoea entirely ceased till the last two days of the patient's life when it was probably due to the diphtherial ptomaines which can cause, in animals and man, profuse diarrhoea.

The coated dry and cracked tongue became moist and clean (strawberry-like) after the first antistreptococcal serum injection and in short the whole coccic symptoms were so checked that I told the husband that his wife would recover, bar accidents, not thinking of any chance of pharyngeal diphtheria at the time. We see then, that the antistreptococcal serum accomplished all that it could be expected to. It did not

cure the diphtheritic infection but being specific in its action it could not be expected to do so but it entirely eliminated the streptococcal element from the symptoms and from the vaginal membrane which from the date of the 2nd injection became dense chamois leather like and purely diphtheritic in character.

We have now cleared the ground for a consideration of the value of the

B. Diphtheritic antitoxic serum.

Now, if the streptococci had as we have seen, a long start of their specific serum, the diphtheria bacilli had even a longer start of their specific serum. The time element is all-important in the consideration of the eventual outcome of a case of microbic infection treated by the specific serum. It has been proved beyond a doubt that every hour lost between the inoculation of the bacilli in animals the injection of and the antitoxic or antibacterial serum, as the case may be, adds enormously to the difficulty of the serum in combatting or vanquishing the symptoms due to the toxins produced by the vital action of the microbes concerned in the case. Now

in this case the coccal symptoms so masked the real nature of the case, that diphtheria was not positively diagnosed till the 8th day when membrane had already appeared on the throat and the patient had been subjected to the action of the diphtheritic toxins for I believe 7 days at least besides having her reduced to a low ebb by the streptococci.

Now when we think again of the time element in the case it is too much to expect that the antitoxin should nullify the ill effects of the toxins and kill the bacilli after a woman, already weakened by another infection has been exposed to the action of the diphtheria toxins for 7 days. An important question arises here whether the action of the usually employed diphtheritic antitoxin which is primarily antitoxic and only secondarily, and in a minor degree bactericidal, though usually a source of strength was not here a source of weakness? I believe that had the diphtheritic antitoxin been also and equally bactericidal and had it thus prevented the formation of diphtheritic membrane in the throat the

patient's life would have been saved. The coccal infection had been thoroughly "scotched," if not killed and the tonsillar and nasal membrane was the immediate cause of death by the action of the toxins causing collapse, diarrhoea and heart failure. To cope with a case like this one, we want a diphtheritic antitoxin which shall be equally antibacterial and antitoxic which the ordinary serum is not. In fact, to really cope with such a case of mixed infection what we want is a serum prepared on the lines on which Bullock is working namely a serum which is at the same time antibacterial and antitoxic towards diphtherial infection and antibacterial towards that particular race of streptococci which is usually symbiotic with the diphtheria bacillus of Löffler.

This is, I believe the most important conclusion that I have arrived at in the whole thesis (though I submit with deference that some of my former conclusions regarding fatigue loss of blood, and the use of antiseptics, have not been fatuous) and I may call this conclusion apologia pro these sua ~~as a result of the exception~~

~~and the fact that the exception is not a new one.~~

The unfortunate thing is however, that Bullock (in his paper in the Lancet May 8th 1896) has shewn, that if we first immunize an animal, such as a horse, against diphtherial bacilli and toxins; and then proceed further to immunize the same animal towards streptococci, by the time its serum has acquired antistreptococcic power, the antidiphtheritic power has, to a large extent, died out. There is, as far as I can see, no reason however why we should not gain the same end by the use of two separate sera, one antitoxic and antibacterial for diphtheria bacilli and the other antibacterial and if possible antitoxic for that race of streptococci which is usually symbiotic with diphtheria bacilli. The two specific sera will not lessen, but will probably augment each others action, and the only objection to two separate sera is the double dose which such a method would involve.

However, I am getting, in my efforts to unravel this Gordian knot of a case reduced to that state of fatigue and bloodlessness which I have already shewn to be so dangerous to anyone exposed, as I am, to microbic infection and shall

therefore conclude this part of my thesis by
an appreciation of the Sero Therapeutic
method in its entire extent.

The first part to which I wish to
draw attention is - that it is precisely
in those cases where ordinary drug treat-
ment has been proved to be almost useless
that the seraoffer and have shewn great
hopes of success. No one can look
at a list of diseases due to microbic
infection without being struck with the
failure of drugs to cope with the case
or shorten its duration. What were the
results of the old treatment of(snake
poison).

Typhoid.

Diphtheria

Tetanus

true Puerperal Septicaemia

Tuberculosis

Infective Endocarditis

Influenza

Cholera

Plague

Smallpox

Pneumonia

It is a moot question which

It is a moot question which line of active treatment in these diseases was more harmful than another and on the other hand, there is no blinking the fact that the expectant or non nocere plan of treatment shewed better results, in the opinion of many well qualified to judge, than any indiscriminate drugging. This is a humiliating conclusion in the present stage of medical science but I believe it to be a true one and ascribe the temporary success of homoeopathy largely to the fact that its practitioners knowingly or not, placed little faith in drugs and much in the vis medicatrix naturae. To sound a personal note, I must say that the consideration of such diseases as these made me for a long time sceptical about the value of drug treatment in cases of this class and the fact that I found the expectant method more successful than any actual interference in the disease, beyond checking symptoms which looked likely to lead to a fatal issue, confirmed me in my paralysing scepticism. I am glad to say that I intimately emerged from this slough of despair, but to my certain knowledge many

respected practitioners still remain in it and regard the ailing crowd as Faustus father did, when the populace ascribed healing powers to him which he knew he did not possess barring the important hypriotic power which does not receive sufficient recognition in medicine.

Here then, I repeat we have a class of disease where the classical methods of treatment are useless or even actually harmful and it is in these very cases that the serum method of treatment offers us its aid. Shall we hide behind in prejudice, repel its advances or should we not rather welcome them with open arms. any one who has seen, as I have done, an undoubted case of infective ^{eudocarditis} (or as the books have it, malignant {meaning thereby that if the diagnosis is correct, the disease is inevitably fatal) rapidly improve under the influence of antistreptococcic serum when all classical methods of treatment have proved futile, and furthermore when the injections of serum were temporarily stopped, the disease at once shewed its presence by metastases diseases, hectic etc. will unhesitatingly

I will in short compare the present methods of treatment of *microbic* diseases to the ~~medi~~ *mediaeval* ~~and~~ plan of treatment based on alchemy and the doctrine of ~~signa~~ *signa* ~~toris~~, and make bold to say, that the present classical method of treatment of microbic disease bears the same relation to the serum treatment, in point of value, as the alchemistic and signatory methods of *mediaeval* ~~medium~~ *cine* ~~bore~~ towards modern methods of treatment. I will in short, go so far as to say that the classical treatment of ~~meadic~~ disease succeeded in so far as it was really based on the methods of serum treatment. Vaccination therefore, represents an *immunizing* ~~imaginary~~ inoculation with a culture of ~~variola~~ *variola* modified by passage through the *Cav* ~~cav~~.

When we contrast the results of the serum treatment of such microbic diseases as diphtheria, tetanus and infective ~~endo~~ *endo* ~~arditis~~ with the results of the classical methods we cannot doubt the value of the newer method E.

THE CONCLUSIONS I HAVE ARRIVED AT FROM A STUDY OF THE PRESENT CASE.

I. Not to think that by giving a disease a name e.g. Puerperal fever, we have explained

its nature and causation

II. Not to think that anti-septics, such as perchloride of mercury, will act as Fetish irrespective of the biological characters of the ~~organism~~ ^{organisms} we seek to destroy.

III. Not to fit our theories to our cases but to build our theories on all the symptoms of the case.

IV. Not to spare ourselves any labour in endeavouring to unravell the causes of our patient's disease.

V. To remain always students and whilst keeping a receptive mind towards the theories and others not to bow too readily to authority but with Whitman to reserve the sacred ^{right} ~~regret~~ of *revolt*

VI. To prevent the proposed legislation which would entrust lying-in women to the care of women qualified only in one branch of medicine and without the requisite training that would enable them to cope with such a case as the present one which, as a matter of fact was left to be treated by a midwife during the first three days of the disease.

VII. To do all in our power to prevent needless loss of blood and fatigue in puer-

peral women by scrupulous care in the direction of early instrumental interference in prolonged labor to prevent fatigue and by careful extraction of the placenta and subsequent care to keep the uterus contracted and thus prevent loss of blood.

VIII. To endeavour to obtain a serum (or complementary sera) which shall be at the same time antibacterial and anti-toxic towards diptheria bacilli thence towards the symbiotic streptococci.

IX. Not to waste time in petty squabbles with professional brethren but to do honest work in the laboratory so far as time will commit.

THE WELLCOME PHYSIOLOGICAL LABORATORIES,

40, CHARLOTTE STREET,
PORTLAND PLACE,
LONDON, W.

Telephone No. 2653, Gerrard.

28th April '98

Dear DeDodd

I am sorry I was not in last evening when you called, but I have no doubt Dr Lüdemersen gave you all the details about the investigation, that we are able to furnish. I am only sorry that they are not positive. I will just state our results again:-

The original swab was used for cultivation in the ordinary way for both broth & solid media. No growth appeared at all on the solid media. In one broth tube an organism was found which had a diphtheroid form. This was subcultured 2 or 3 times to obtain if possible a typical ^{diphtheria} organism. The attempt however was a failure & subsequently a 4 day broth culture was used (3.5 cc) to inject a guinea pig (250 grms). No ill-effect followed beyond a slight local oedema. The organism then is.

Not pathogenic.

We are unable positively to state that this organism was or was not originally present in the swab you sent to us, as the tubes etc necessarily underwent a frequent manipulation, and the growth only appeared after considerable delay.

The cause for your non-success is without doubt due to the necessary abundant use of antiseptics in treatment of the case.

The swab submitted to us contained a large quantity of a tough yellowish membrane but smelt strongly of iodoform. The examination of the membrane itself was unsuccessful in demonstrating the presence of any organisms.

I have notified the firm re the diagnosis enveloped which will reach you in a day or two.

We shall be very pleased to supply you professionally with culture media, but we do not supply media in any quantity as a general rule or to the trade.

We.

THE WELLCOME PHYSIOLOGICAL LABORATORIES,

40, CHARLOTTE STREET,
PORTLAND PLACE,
LONDON, W.

Telephone No. 2653, Gerrard.

We have to thank you for your kind gift
of "hydrocele fluid" which is always
just difficult to get and very useful to
us in the preparation of certain culture
materials.

Yours faithfully
Cecil Revis

A P P E N D I X.

Brief notes of 6 cases of my own observation of Puerperal septic disease and Tables of similar cases from literature shewing the good results from the use of anti-streptococcic serum.

Table of my own
cases

400's
with
Dodd's
Therapies

A. Tabular statement of cases of Puerperal Fever by coming under my own observation compiled by E. R. Dodds

Name and Nature of case.	Observer	Antiseptics	Day of cure when serum returned	Result	Bacteriological confirmation	Remarks
I. Brayer Pure Septicaemia <u>Sapraemia</u>	E. R. Dodds	were entirely successful.	—	cure	—	This case shows that antiseptics and curetting will ensure a cure in purely Sapraemic cases
II Bullen Sapraemia + a certain amount of Septicaemia	"	checked but did not seem to kill the disease	—	eventual cure	—	The case eventually recovered but the Septicaemia ran its course.
III Thompson Pure Septicaemia	"	were employed but proved useless	3 rd day	cure	wanting	Looked at first hopeless
IV So Brown Septicaemia with a little Sapraemia	"	again proved almost useless	3 rd day	cure	purely streptococci	Very suggestive of its proof of the value of the serum.
V Trevella Septic typhoid m. e. Ague?	"	still useless	5 th day	cure.	purely streptococci	This case also appears to show that the serum will cure ague!
VI Swann Conveyed Septicaemia	"	entirely useless	—	Death on 5 th day	—	The clarrical treatment was an utter failure. 3 1/2 years ago
VII Clegg Septicaemia + Diphtheria Throat	"	worse than useless except 3 on	10 th day Death on 10 th day	inconclusive	—	it was rather a clear

TABLE
of
CASES from
Literature

Cases collected from literature of Puerperal Fever compiled by G. R. Dodd.						
Nature of Case	Observer	Antiseptics	Day of Disease when serum used	Result	Bacteriological examination	Remarks
Intense Septicaemia	Playfair in all. Soc. Vol. 2 Page 648	were powerless	—	Death 9th Day	—	The classical Type of case.
Sapraemia	Playfair Ibid. p. 644	one intra uterine iodine douche cured the case	—	Recovery	—	This is the class of case where antiseptics are so valuable.
Severe Septicaemia	J. D. Williams B.M.T. Oct 31. 96.	Powerless	11th day	Recovery	—	
Sapraemia + Septicaemia	"	checked the sapraemia	12th day	"	—	serum appeared to cause pneumonia
Septicaemia + Sapraemia	"	?	14th day	"	Streptococci abundant.	
Septicaemia + Sapraemia from vaginal plugs? 3rd month abortion.	"	were only of slight benefit	Total 60 cc 7th day	"	—	Rare produced by the serum
Septicaemia + Sapraemia	"	"	7th day	"	—	"
Septicaemia	"	?	10th Total dose only 20 cc	Death	—	Probably the time between infection and use of serum was too long

APPENDIX.

own
As a fitting corollary to my thesis, I here append brief notes of cases of Puerperal septic disease occurring in my practice, and others collected from literature, with special attention to the relative value of the serum treatment as compared with the classical treatment.

First then. Cases of Puerperal septic Disease coming under *my* ~~any~~ *own* observation.

(1) A case of Puerperal sapraemia^{*mia*}, occurring after a 5 months miscarriage, ^{*and*} ~~is~~ due to the neglect of the attendant *midwife* to remove the whole of the placenta. On the 10th day of the puerperium^{*own*}, when I first saw the case, there was an extremely offensive *lochial* discharge and the patient had severe *abdominal* ~~additional~~ pain, T. of 105° F. and the usual signs of septic intoxication. The classical method of treatment; viz:- curettement of the uterine ^{*cavity*} ~~cavity~~, followed by the two intra uterine douches proved entirely successful as to the temperature came down to normal within 24 hours of the *first douching*.

It is precisely in these cases of pure sapramia that antiseptic irrigation (preceded where requisite, by curetting), is so valuable. We must be careful, however, not to think that we can obtain similar good results by antiseptic irrigation, in

septicaemic cases. It is apparently, only where the "^{morbi}materies ~~work~~" is so situated that it can be remed^{ered} by mechanical means such as curetting and ^{douching}douching that antiseptics are of value. My next case also, occurring in my own practice, appears to bear this out.

It is a case of sapraemia⁹ associated ^{with}septic-aemia. The woman, a multipara had her cervix considerably ^{lacerated}limited by the passage of a large child's head and the size of the child's head also caused a perineal tear up to, but not through, the ^{perineal}sphincter ani. The lochial discharge was offensive and there was a "puerperal" ulcer on the perineal tear. The placenta and membranes had been all successfully expressed. On the 3rd day after delivery, her Temperature went up to 105° but the use of an antiseptic intrauterine ^{douche}~~ouches~~ (4 ^{Hyd. Perchlor}yd. perchloric in 4000) ^{and}carried with general antipyretic treatment such as Quinine, alcohol and sparging the temperature down to 99° within 12 hours. The perineal ulcer was scrapped and then dressed on the dry plan with tiodofan and Boracic Acid. The temperature went up ~~to~~ again to 104°F, 36 hours after the first douching and in short, it was only by repeated intrauterine ^{and}douches given night and morning for 10 days that I was able to check and ultimately cure the disease. ^{whenever}~~whenever~~

before that, I refrained from intrauterine douches the temperature went up at once 2 or 3 degrees and the pyrexial symptoms returned. This case occurred two years ago, when the powers ^{of} anti streptococcie serum were not so widely known as they are now, I believe that had I ~~known~~ ^{known} of, and used the anti streptococcie serum at the beginning of the disease, the patient would have recovered ~~promptly~~ and been saved the ordeal of a severe illness with the consequent evil after-effect. The fact that in this case, though the temperature approached the normal, it did not actually reach it until the disease had ~~cleared~~, was due to some true septicaemic infection, probably from the perineal ulcer. Here again, though the antiseptic plan of treatment was of great value, the disease lasted for 12 days before the patient was out of danger and a comparison with cases mentioned later, where the antiseptic serum was used from the outset shows that the serum is a much more potent agent in effecting a cure ^{than antiseptics} where there is any real septicaemia present, if only it is used sufficiently early in the case and in large enough doses. This is shown in the next case which occurred in a friend's practice, though I saw it in consultation with him. The patient was a multipara, and after an easy confinement she went on well till the 6th day when she showed signs of septic infection, her temperature

going up to 102°F in the afternoon and other symptoms such as diarrhoea, headache and abdominal pain being present. The Lochia were suppressed. The usual intra ^{uterine} ~~uterine~~ douche was given and the other ~~classical antipyretic~~ ^{classical antipyretic} ~~classical antipyretic~~ measures, quinine, stimulants and ~~sponging~~ ^{sponging}, adopted, but on the second day of disease the morning temperature was 102.6 and the evening temperature 103.6 in spite of the douching. On the 3rd day of the disease the morning temperature was 102.6 and in the afternoon at 4.30, 103.8. after consultation 20c.c. of anti streptococcic serum were injected on the 3rd afternoon and the other treatment stopped. By 11.30 the same night i.e., in seven hours the Temperature has come down to 101°F, and the next morning it was normal and remained so. The patient made a rapid recovery. There was a history of exposure to ~~sewer~~ ^{emanations} ~~sewer~~. The case is instructive as it shows that where antiseptics had failed, the serum effected a rapid cure.

The next case, that of Mrs B. who had been attended at her confinement by a colleague, shows equally good results from the serum treatment.

The delivery was ^{instrumental} ~~instrumental~~ as the head would not pass the brim without help, the perinaum was torn and the tissues were considerably bruised by the ~~forceps~~ ^{forceps} and the large head. An antiseptic intrauterine douche was given after expression of the placenta

The pulse was 120 per minute and the temperature 104. Seeing that antiseptic irrigation had failed entirely to check the disease, we determined, in consultation, to inject the anti-streptococcic serum and owing to the gravity of the case adopted the plan of giving a large initial dose and maintaining the effect by 12-hourly smaller doses. The effect of the injection at 12 noon may be barely described as magical. Within 6 hours of the injection the Temperature had fallen to 100 and the tongue had cleaned. A second injection of 10 C.C. was given at 12 midnight and at 10 a.m. the next (4th) day the temperature fell to normal and remained so. The patient made a rapid recovery. The case was in all respects a test one as the usual methods again failed entirely in checking or even modifying the cause of the disease whereas the injection of the specific serum was followed at once by a marked improvement and resulted in recovery. Moreover on bacteriological examination of the pus taken from the vagina before injection of the serum, streptococci were found in great number. The next case presents some interesting fea-

tures and would appear to indicate that
antistreptococcic serum possesses besides its
specific properties, a power of curing ague.

On my first visit to this patient
one evening some 6 months ago, I found
her complaining of severe abdominal pain, and
haemorrhage from the vagina and found that
she had passed a few ~~hydated~~ vesicles derived
from a ~~hydated~~ mole. I prescribed Ext. ~~big~~ ^{lig} ~~lig~~
ⁱⁿ m XXX doses every three hours and ordered
a hot vaginal douche. Next morning the
temperature was 105 F. Pulse 130 about a
quart of vesicles had been passed during the
night. On P.V. examination, I found the OS
ospatulous and vesicles hanging from it.
In the afternoon, I ~~curried~~ ^{curetted} the uterus,
bringing away a considerable number of ves-
icles and pus. After clearing out the uterus
thoroughly I douched with perchloride of
mercury and then swabbed it out with
plugs of lint covered with iodoform.

3rd day.

Pulse 120 temperature 104

4th day. pulse 115 Temperature 103.

5th day pulse 130 Temperature 108 in the mor-
ning. I injected 20 C.C. of anti-streptococcic
serum in the evening about 10.30 with strict

anti-septic precautions.

On the 6th day in the morning temperature was 101.4 pulse 100, a drop of $3\frac{1}{2}$ degrees. I injected 10 c.c. more serum. On the evening of the 6th day the temperature was 100 F. Pulse 100. I again injected 10 c.c. more serum and was gratified to find, on my visit on the morning of the 7th day, a temperature of 98.2. The temperature remained, from this time, normal though no more serum was injected. At the end of a fortnight the patient was out of bed and beginning to regain strength.

The subsequent history of the case is extremely interesting. 20 days after her temperature became normal, she had an attack of ~~hem~~^{men}orrhagia and a temperature of 102.6 I injected 20 c.c of anti-streptococcic serum and the temperature returned to normal within 24 hours, the hemorrhagia moreover gradually ceased. At the expiration of other 20 days she had a severe attack of ague in tow one in the morning, the other in the afternoon. I saw her during the latter attack and pronounced it typical ague. The temperature reached 107 F. in this attack.

I gave large doses of quinine and arsenic for two days but they had hardly any effect. Then I injected the anti-streptococcic serum again with the result that the patient at once began to improve and was completely well in five days. Now, I am certain that these were not pyaemic rigors, as I saw four of them from start to finish and having had considerable experience of ague and also some experience of pyaemia, I could not have been mistaken the patient continued to have attacks of ague every three or four weeks and the antistreptococcic serum invariably ceased the complaints for the time being. The patient removed for family reasons to another district so I am unable to give the subsequent history of the case.

My next and concluding case offers a striking contrast to the three preceding ones as regards the result to the patient. It belongs to the type² of disease now, happily becoming rare, where conveyed infection kills the patient by the violence of its onslaught antiseptics antipyretics and stimulants proving alike useless in the prevention of a fatal issue.

The case occurred three years ago when I was

an assistant and was caused by contagion conveyed by a midwife from a previous puerperal fever case. The woman who ~~must have~~ lived in a filthy slum in West Hartlepool, had an easy confinement but was *moribund* by the time I saw her, on the 4th day of the disease. Pulse 150, diarrhoea extreme, low muttering delirium and general prostration I gave stimulants in large doses douched the uterus with perchloride of mercury and administered quinine, but all my efforts were unsuccessfull as the woman died collapsed on the 6th day of the disease. The case made a great impression on me as the classical methods proved futile and when I remembered such a case, I can never be sufficiently thankfull for the discovery, by the means of much maligned "vivisection" of such a method of treatment as the serotherapeutic, which has been proved to bring about a cure when all other means have failed.

This case concludes the list of cases of "puerperal" Fever" observed by myself and I would wish to point ^{out} that ^{out} of these 6 cases only one was primarily attended in her confinement by me when I had no similar case for 6 months and used all antiseptic

precautions. I believe the explanation of my meeting with an apparently large number of cases of puerperal fever (7 in the course of $3\frac{1}{2}$ years) is that my fellow practitioners (and midwives) knowing that I have had perhaps exceptional opportunities in my wanderings for seeing puerperal fever cases, have kindly called me in when they have had to treat such a case.

-----oo0oo-----

I entirely thank
you for all this
kindness
S R Dodds